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10/713,355	11/17/2003	Munehiro Tabata	040356-0496	9164

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EXAMINER	
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ART UNIT	PAPER NUMBER
3748	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/713,355	TABATA ET AL.	
	Examiner	Art Unit	
	TU M. NGUYEN	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. An Applicant's Request for Reconsideration filed on December 21, 2008 has been entered. Overall, claims 15-29 are pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 15, 16, 24, and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. (U.S. Patent Application 2003/0113249) in view of Moraal et al. (U.S. Patent 6,574,956).

Re claims 15, 27, and 28, as shown in Figures 1, 2, 4, and 6A, Hepburn et al. disclose a purification device for an exhaust gas of a diesel engine (12) and a method for controlling said purification device, the diesel engine comprising a catalyst (19, 54) which traps nitrogen oxides in the exhaust gas but decreases a nitrogen oxides trapping performance when poisoned by sulfur oxides in the exhaust gas, and a filter (19, 42) which traps particulate matter in the exhaust gas, the device comprising a programmable controller (34) programmed to:

- determine (step 224) if an elimination of the sulfur oxides poisoning the catalyst is required;

- perform a process of eliminating the sulfur oxides poisoning the catalyst, when elimination of the sulfur oxides poisoning the catalyst has been determined to be required (step 224 with YES answer, step 226, step 236 with YES answer, step 238, and steps 264-274);

- determine (step 274) if a regeneration of the filter is required while performing the process of eliminating the sulfur oxides;

- perform the regeneration of the filter while interrupting the process of eliminating the sulfur oxides, when the regeneration of the filter has been determined to be required (step 274 with YES answer, step 276, and steps 278-282);

- determine (step 282) during the regeneration of the filter if a residual particulate matter in the filter has decreased to a level; and

- stop the regeneration of the filter and resume the process of eliminating the sulfur oxides poisoning the catalyst, when a residual particulate matter in the filter has decreased to the level (step 282 with YES answer, step 284, step 286 with NO answer, and steps 264-274).

Hepburn et al., however, fail to disclose that during the regeneration of the filter, the level is an amount of residual particulate matter in the filter above which the filter is allowed to be regenerated without causing thermal damage to the filter.

As indicated on lines 31-34 of column 1, Moraal et al. teach that it is conventional in the art to interrupt a regeneration cycle of a particulate filter if the filter temperature exceeds a temperature range having an ignition temperature as a lower limit (lines 49-51 of column 3) and a critical threshold as an upper limit. It is obvious that at a time of interruption, the filter is at a

predetermined decrease state corresponding to a particulate matter trap amount smaller than a predetermined amount (an amount that activates the regeneration cycle) and larger than zero (when fully regenerated). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Moraal et al. in the device of Hepburn et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to prevent thermal degradation to the filter.

Re claim 16, in the modified purification device of Hepburn et al., the process of eliminating the sulfur oxides poisoning the catalyst is performed by causing the catalyst to contact with an exhaust gas corresponding to a rich air-fuel ratio, and the regeneration of the filter is performed by burning a trapped particulate matter by causing the filter to contact with an exhaust gas corresponding to a lean air-fuel ratio (see Figure 6A and paragraph 0071).

Re claim 24, in the modified purification device of Hepburn et al., the controller is further programmed to determine that the residual particulate matter in the filter has decreased to a level which does not damage the filter, when the exhaust gas has been maintained in a state corresponding to the lean air-fuel ratio for a predetermined time (DPMCNT_PRD).

Re claim 29, in the modified purification device of Hepburn et al., the diesel engine is used for driving a vehicle, and the controller is further programmed to determine that the elimination of the sulfur oxides poisoning the catalyst is required on the basis of a fuel consumption amount of the diesel engine after the latest elimination of sulfur oxides poisoning (see steps 212 and 214 and paragraph 0057).

4. Claims 17 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. in view of Moraal et al. as applied to claim 16 above, and further in view of Hoffmann et al. (U.S. Patent 6,938,411).

Re claim 17, the modified purification device of Hepburn et al. discloses the invention as cited above, however, fails to disclose that the device further comprises a sensor that detects a differential pressure between an inlet and an outlet of the filter, and the controller is further programmed to determine if the regeneration of the filter is required based on the differential pressure.

As shown in Figure 1, Hoffmann et al. disclose a system for removing NOx, SOx, and particulates from the lean exhaust gas of teach an internal combustion engine, comprising a NOx trap (3) and a particulate filter (4). Hoffmann et al. further teach that the system further comprises a sensor (7) that detects a differential pressure between an inlet and an outlet of the filter, and the controller is further programmed to determine if the regeneration of the filter is required based on the differential pressure. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching taught by Hoffmann et al. in the modified purification device of Hepburn et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to accurately determine a timing to regenerate the filter.

Re claim 26, in the modified purification device of Hepburn et al., the controller (34) is further programmed to determine that the residual particulate matter in the filter has decreased to a level which does not damage the filter (when step 282 has YES answer), when the controller started to generate the exhaust gas corresponding to the rich air-fuel ratio for the first time.

5. Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. in view of Moraal et al. as applied to claim 16 above, and further in view of Kuenstler et al. (U.S. Patent 6,594,990).

Re claim 20, the modified purification device of Hepburn et al. discloses the invention as cited above, however, fails to disclose that the device further comprises an intake throttle that regulates an intake air amount of the engine, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of the intake throttle.

As shown in Figures 1-2, Kuenstler et al. disclose a method for regenerating a diesel particulate filter (10) located at an exhaust path of a diesel engine (5). Kuenstler et al. further teach that their engine comprises an intake throttle (2) that regulates an intake air amount of the engine during a regeneration control of the filter, and a controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of the intake throttle (in step 27). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the invention of Hepburn et al. in the engine taught by Kuenstler et al., since the use thereof would have provided an effective means to remove both NOx and particulate matter in an exhaust gas stream.

Re claim 21, the modified purification device of Kuenstler et al. further comprises a fuel injector (6) which injects fuel into the exhaust gas of the engine, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust

gas corresponding to the lean air-fuel ratio through control of a fuel injection amount of the fuel injector.

Re claim 22, in the modified purification device of Kuenstler et al., the engine comprises an exhaust gas recirculation passage (EGR system) which recirculates part of the exhaust gas into an intake air according to an exhaust gas pressure of the engine, the purification device further comprises an exhaust throttle (3) which regulates the exhaust gas pressure, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of the exhaust throttle (in step 25).

Re claim 23, the modified purification device of Kuenstler et al. further comprises a fuel injector (6) which supplies fuel for combustion, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of a post-injection by the fuel injector after fuel is supplied for combustion (in step 30).

6. Claims 18-19 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. in view of Moraal et al. as applied to claim 16 above, and further in view of legal precedent.

Re claims 18-19, the modified device of Hepburn et al. discloses the invention as cited above, however, fails to disclose that the exhaust gas corresponding to the rich air-fuel ratio corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 0.95 to 1.0; and that the exhaust gas corresponding to the lean air-

fuel ratio, corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 1.05 to 1.1.

Hepburn et al. disclose the claimed invention except for specifying an optimum range of excess air factor of 0.95 to 1.0 and 1.05 to 1.1 for the rich air-fuel ratio condition and the lean air-fuel ratio condition, respectively. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of excess air factor for each of the rich air-fuel ratio and the lean air-fuel ratio condition, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re claim 25, in the modified purification device of Hepburn et al., the controller is further programmed to determine that the regeneration of the filter is required when the particulate matter trap amount is saturated. Hepburn et al., however, fail to disclose that the residual particulate matter in the filter has decreased to the level which does not damage the filter when the particulate matter trap amount is zero.

Hepburn et al. disclose the claimed invention except for specifying that a particulate matter trap amount is zero is a level at which a regeneration of the filter does not damage the filter. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum value of residual particulate matter in the filter to terminate the filter regeneration, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Response to Arguments

7. Applicant's arguments with respect to the references applied in the previous Office Action have been fully considered but they are not persuasive.

In response to applicant's argument that Hepburn et al. fail to disclose or teach a programmable controller programmed to "determine if a regeneration of the filter is required while performing the process of eliminating the sulfur oxides" (page 8 of the Applicant's Request for Reconsideration), the examiner respectfully disagrees.

In Hepburn et al., they monitor a catalyst (19) in step 224 to determine if the catalyst is saturated with SOx. When this is the case, they perform a routine shown in Figure 4B where an accumulated amount of SOx is monitored in step 236 to determine if a combined SOx and particulate matter purge (SOXREG1-PMREG1) should be executed. In this combined purge, which is depicted in Figure 4C, a process of eliminating SOx stored in the catalyst is performed first. During this process, a timer is monitored in step 274 to see if an intermediate SOx purge has been sufficiently performed. If the answer in step 274 is YES, a regeneration of the catalyst to burn off an accumulated particulate matter would follow (see step 276 and steps 278-282). The examiner has concluded that in step 274, Hepburn et al. determine if a regeneration of the catalyst to remove particulate matter is required while performing a process of eliminating the SOx. Thus, in a broad reasonable interpretation of the claim language, Hepburn et al. indeed disclose or teach the claimed limitation in dispute. Claims in a pending application are given their broadest reasonable interpretation. See *In re Pearson*, 181 USPQ 641 (CCPA 1974).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Communication

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Tu M. Nguyen/

TMN

Tu M. Nguyen

April 11, 2008

Primary Examiner

Art Unit 3748